



PhD position co-financed by La Région OCCITANIE and two industrial partners

To start in October 2017

On-board hydrogen generation by partial catalytic partial dehydrogenation of liquid fuels

Laboratoire des Agrégats, Interfaces et Matériaux pour l'Energie

Context

One of the objectives of the aeronautic industry is to provide a more efficient and greener aircraft fleet environment. In this context a new generation of more electrified aircraft must be developed. One of the technologies on the MEA roadmap is a fuel cell secondary power generation unit replacing the current Auxiliary Power Units (APU). The project is based on the concept for hydrogen generation on-board an aircraft by partial dehydrogenation of kerosene jet fuel. The use of kerosene as source of hydrogen is of great interest as the lack of oxygen in the kerosene composition makes it suitable for partial dehydrogenation to produce dehydrogenated hydrocarbons in the liquid phase and hydrogen in the gas phase. The hydrogen is free of CO and CO₂ and so can directly feed the on-board fuel cell for supply of electrical energy to auxiliary systems, without a purification step. The liquid phase, composed of partially dehydrogenated hydrocarbons, maintains its original fuel properties with the requisite specifications to be used as jet fuel.

Objectives

The primary aim of the research project is to improve hydrogen productivity without detriment to the purity of the hydrogen generated, which requires development, optimization and scale-up of advanced catalysts, as well as process optimization. The other objective is the integration of the resulting catalyst and reformer technology with a PEM fuel cell stack to provide electricity, heat and water. A highly efficient integrated system, with a PEM fuel cell stack will be developed, for the validation of the partial dehydrogenation reaction process.

Expected candidate profile

Candidates are expected to be highly motivated and capable of working independently, with a qualification of a Master's level in Inorganic Chemistry or Materials Science. The work will concern with integration of the hydrogen supply unit from liquid hydrocarbons, with a PEM fuel cell stack. Some knowledge of heterogeneous catalysis and of fuel cell electrochemistry would be advantageous. This student will participate in project meetings, especially with the two industrial partners, and international conferences and will have the opportunity of co-authoring high impact research publications. The position is open internationally, and good English proficiency is essential.

Contact

To apply for this PhD position, please send a CV, the names of two referees and a cover letter to melanie.taillades-jacquin@umontpellier.fr